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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/141,289 08/27/98 ROEHRIG

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020583 LM31/0104  
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EXAMINER

PATEL, J

ART UNIT

PAPER NUMBER

2723

DATE MAILED:

01/04/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.  
09/141,289

Applicant(s)  
JIMMY R. ROEHRIG et al.

Examiner  
Jay K. Patel

Group Art Unit  
2723



☒ Responsive to communication(s) filed on Aug 27, 1998

☐ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire THREE month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claim

☒ Claim(s) 1-20 is/are pending in the application

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 1, 10, and 15 is/are rejected.

☒ Claim(s) 2-9, 11-14, and 16-20 is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☒ None of the CERTIFIED copies of the priority documents have been received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 4

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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### **PART III     DETAILED ACTION**

#### ***Priority***

1. If applicant desires priority under 35 U.S.C. 120 based upon a previously filed copending application, specific reference to the earlier filed application must be made in the instant application. This should appear as the first sentence of the specification following the title, preferably as a separate paragraph. The status of nonprovisional parent application(s) (whether patented or abandoned) should also be included. If a parent application has become a patent, the expression "now Patent No. \_\_\_\_\_" should follow the filing date of the parent application. If a parent application has become abandoned, the expression "now abandoned" should follow the filing date of the parent application.

Page 1, line 14, status of the Application Serial No. 08/676,660 should be updated as, "now Patent No. 5,815,591".

#### ***Drawings***

2. The drawings filed on August 27, 1998 have been objected by draftperson under 37 CFR 1.84. See attached form PTO-948 for draftsperson's comments.

3. Since allowable subject matter has been indicated, applicant is encouraged to submit formal drawings in response to this Office action. The early submission of

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formal drawings will permit the Office to review the drawings for acceptability and to resolve any informalities remaining therein before the application is passed to issue. This will avoid possible delays in the issue process.

***Specification***

4. The disclosure is objected to because of the following informalities:

Page 2, line 21, replace phrase "improves" by - - improve - -.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al. (US. 5,657,362) in view of Merickel et al. (US. 5,003,979) and further in view of Gur et al. (US. 5,627,907).

Regarding claim 15, Giger discloses an automated system for computerized detection of masses and parenchymal distortions in medical mammographic images comprising:

means for computing mass information corresponding to the digitized mammogram ( column 6, lines 40-65), the mass information having location information (column 7, lines 35-45 and figure 27, element 2709), wherein the mass information is related to the features of potential lesions and location of such lesions are computed using the location circuit,

means for computing spiculation information corresponding to the digitized mammogram (column 8, lines 23-35), the spiculation information having location information (figure 21A-21I), wherein the spiculation information is related to the feature analysis of potential lesions and location of such lesions are computed using Hough spectrum based on the geometric analysis,

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means for classifying the mass information and the spiculation information for detecting the suspicious portions of the digital mammogram (column 13, line 66 through column 14, line 19), wherein Giger discloses a system that characterizes lesions such as masses and tissue distortions in breast images (column 15, lines 5-10).

In figures 12C (step 1225) and figure 14 (step 1407), Giger discloses means for computing mass and spiculation information respectively. However, Giger is silent about specific details regarding the means for computing mass and spiculation information independently.

In the same field of endeavor, however, Merickel discloses a system for noninvasive identification and display of breast lesions comprising a pattern recognition system comprising means for computing spiculation information (column 9, lines 36-45), wherein such information includes size and shape of the lesion. While Merickel deals with only spiculation information, Gur discloses a system for a computerized detection of masses and microcalcifications in digital mammograms comprising means for computing mass information only (column 22, lines 2-42), wherein such information includes size, contrast and shape information of the suspected region (figure 4B, step S12).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the means for computing mass and spiculation information independently as taught by Merickel and Gur because the system of

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Merickel permits Giger to effectively utilize the spiculation information into a reduced number of high information content images which provide information that is readily usable and also helpful to others than the radiologist such as attending physician, surgeon and the patient. The system of Gur balances the high detection sensitivity of computer assisted detection systems of Giger with true-positive and low rates of false-positive detection. Therefore, the systems of Merickel and Gur provide Giger with systems that would independently and reliably detect any potential abnormalities by reducing the numbers of false-positive diagnosis of malignancies, thereby decreasing patient morbidity and reducing the numbers surgical biopsies performed. Further, the independent systems of Merickel and Gur would obviously provide a redundancy to the system of Giger, wherein if lesion is missed by mass detection, it would be detected by spiculation detection.

As to claims 1, the steps claimed as method is nothing more than restating the function of the specific components of the apparatus as claimed above and therefore, it would have been obvious, considering the aforementioned rejection for the apparatus claims 15.

As to claims 10, the steps claimed as computer code is nothing more than restating the function of the specific components of the apparatus as claimed above and therefore, it would have been obvious, considering the aforementioned rejection for the apparatus claims 15.

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***Allowable Subject Matter***

7. Claims 2-9, 11-14 and 16-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Giger, Merickel and Gur fail to teach or suggest a system, wherein the means for computing spiculation information computes the spiculation information **prior to or substantially in parallel** with a period in which means for computing mass information computes the mass information, in combination with the other elements of the apparatus claim 16, base claim and any intervening claims; in combination with the other elements of the corresponding method claim 2, base claim and any intervening claims, and in combination with the other elements of the corresponding computer program product method claim 11, base claim and any intervening claims.

The phrase "concurrently" of claims 2 and 11 to compute mass and spiculation information has been interpreted as being in parallel as indicated above. The instant application as recited in claims 2, 11 and 16, provides an invention that addresses the problem of inevitable dependency between the mass and spiculation algorithms. The claimed invention as recited in claims 2, 11 and 16, provides an increased speed and reliability in computing necessary mass and spiculation information.



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8. As to claims 17-20, 3-9, 12-14, claims 17-20, 3-9, 12-14 being dependent on claims 16, 2 and 11 respectively, and are objected for the same reasons.

***Other prior art cited***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nishikawa et al. (US. 5,673,332) discloses a computer-aided system for image feature analysis and diagnosis (figure 11B) in mammography.

Bamberger et al. (US. 5,854,851) discloses a system for diagnosis of living tissue (column 14, lines 45-60) using digital image processing.

Goldberg (US. 5,260,871) discloses a method and apparatus for diagnosis of breast tumors (figure 1A).

Wang (US. 5,828,774) discloses a computer-aided diagnosis system to detect suspected abnormalities (figure 1, element 50) in mammographic images.

Clarke et al. (US. 5,799,100) discloses a computer-assisted system for analysis of X-ray images using wavelet transforms (figure 7 a-f).

Mascio (US. 5,586,160) discloses an automated analysis for microcalcifications in high resolution digital mammograms.

Giger et al. (US. 5,832,103) discloses an automated system for improved computerized detection and classification of masses in mammograms.

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Asada et al. (US. 5,622,171) discloses a system for differential diagnosis based on clinical and radiological information using artificial neural networks.

Giger et al. (US. 5,133,020) discloses an automated system for the detection and classification of abnormal lesions and parenchymal distortions in digital medical images.

***Contact information***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jay Patel whose telephone number is (703) 308-7728. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900. The facsimile phone number for this group is (703 ) 308-5397.



Jay Patel  
Patent Examiner  
Group Art Unit 2723

  
**JAY PATEL  
PATENT EXAMINER**

December 30, 1999